sponsibility of men of science to their fellow men. The second part expresses the pure objectivity of science and states conditions only under which it can flourish permanently. Differing from the 1933 resolution of the American Association and from possible interpretations of the comments in *Nature*, this preamble is in no degree political or national. There is in it absolutely no note of criticism of governments or of social orders, for condemnatory words seldom lead to harmony and cooperation.

The resolution itself also consists of two parts, the first of which pertains only to the American Association. It expresses directly only what has long been a distinct policy of the association. For example, the Section on Medical Sciences is now organizing the tenth of its symposia, participated in by leading American specialists, on subjects (in this case mental health) of wide public interest and importance. Another section has held important symposia on various aspects of conservation of natural resources, while still another has made plans for five symposia on the general title "Science and Society," of which one has been held.

The second part of the resolution relates entirely to international cooperation of men of science. The invitation to cooperation is not dependent on racial, political or theological qualifications; it is open to every organization in the world the purposes of which are to spread the benefits of science to all mankind.

This sadly disordered world needs some new objective upon which it can focus its attention, some new course of procedure which it will ardently follow. It is possible that men of science can set up such an objective and gradually work out practicable methods for attaining it. Certainly, of all the conclusions that men hold, those of scientists are most easily verifiable and the methods of scientists are most easily evaluated and standardized. The verifiable nature of much of the work of scientific workers and the relative freedom of their conclusions from emotions and prejudices insures for them from the beginning a considerable amount of common ground. Possibly this common ground can be gradually enlarged until it will form a substantial basis for the general progress of civilization. Is it too much to hope that international problems of health, for example, that have been precipitated by the applications of science should be attacked and solved by scientists? Would not the altruistic spirit exhibited by science meet a compelling response in the general conscience of mankind?

Without anticipating what recommendations the American Association may desire to make respecting the purposes of the proposed conference, and not wishing to do more here than to open the question for preliminary discussions, I suggest three things that might be considered and attempted: (1) The formulation of a set of fundamental scientific principles of an ethical nature on which unanimous agreement of the delegates can be reached. (2) The formulation of the maximum number of inviolable methods of international intercourse and cooperation among scientists on which the delegates can unanimously agree. (3) The planning of the necessary machinery for making effective and enlarging the agreements reached in (1) and (2).

To the above communication P. G. H. Boswell, general treasurer, and F. T. Brooks and Allan Ferguson, general secretaries of the British Association, made a reply, which was printed in the issue of *Nature* for March 26, 1938. It reads:

We are glad to read the letter in *Nature* of March 19, under the above heading, from Dr. F. R. Moulton, Permanent Secretary of the American Association for the Advancement of Science. It need scarcely be said that the invitation from that body to the British Association to cooperate in forming the nucleus of a wider organization for this great object is engaging our earnest attention, and has already been brought to the notice of the council of the British Association. We look forward to meeting Dr. Moulton and some of his colleagues this summer, to discussing the project with them, and to having them with us at our meeting in Cambridge. It may be added in regard to the last clause in Dr. Moulton's letter concerning the "planning of the necessary machinery," that a scheme in rough outline has already been forwarded to him for informal comment, in the hope that it may prove possible, whether on the basis of that scheme or of some other, to lay practical proposals before the governing bodies of both associations at an early date.

SCIENTIFIC BOOKS

PHYSIOLOGICAL OPTICS

Introduction to Physiological Optics. By JAMES P. C. SOUTHALL. Oxford University Press, 1937.

ANY one acquainted with the author and his previous publications verifies his expectations of a creditable work on perusing this latest contribution. Professor Southall is modest in considering this an "Introduction" to the subject. It is such only in the sense that a single volume of reasonable size can not encompass all aspects of physiologic optics adequately plumbed to their depths. Some subjects, such as eyes, refraction and binocular vision, are discussed sufficiently for any general treatise. Color-vision and colorimetry are perhaps over-emphasized from an over-all view-point. Psychophysiological aspects are almost entirely ignored. In brief, the discussions are chiefly confined to certain aspects of vision and rarely touch the larger realm of seeing.

In fairness, it should be stated that Professor Southall has confined himself to the ground rules which he established in the preface. The boundaries of physiologic optics have not been established by any absolute authority and, therefore, an author may place them where he wishes for his particular purpose.

Nevertheless, a reviewer is confronted with the task of viewing a treatise in proper perspective or relation to the entire realm of which it is a part. Between the external world of visual objects and the accomplishment of seeing, and of the effects of this activity upon human behavior and welfare, lies the generally accepted realm of physiologic optics. Treatments of the latter touch so incidentally upon the external world of objects, brightnesses and colors that, with the exception of eyeglasses, the controllable factors which make seeing easy or difficult, certain or uncertain, are unduly submerged. This is also true of the human aspects and ends of seeing, for they are inadequately developed by incidental excursions into the realm of perception.

The practice of restricting the scope of treatises on physiologic optics, or of not giving at least a glimpse of the entire picture, is responsible for the widespread misconception that vision encompasses seeing. As a consequence, human beings living in a world built largely by and for seeing are paying unnecessary penalties for inadequate and improper seeing conditions, which can be corrected only by attention to seeing as well as to vision. This glimpse is not presented as a criticism but as a plea for the treatment of physiologic optics with the breadth, vitality and importance that the subject deserves as a formidable part of seeing. Other aids to seeing can be treated with the same justification as eyeglasses are. Concomitantly, glimpses are also justified of new knowledge pertaining to effects of seeing upon human beings, their performance and accomplishments, penalties and rewards. After all, vision is merely a link in a chain from the external world of visual objects to seeing and its end-products. Something can be done about vision, but much more can be done with the controllable factors in the external world which in turn greatly affect the end-products of seeing. As long as physiologic optics is treated as an isolated realm, the growth of a general understanding of seeing will be inhibited.

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THE STRUCTURE OF MATTER

Elasticity, Plasticity and Structure of Matter. By R. HOUWINK, Plastics Departments, N. V. Philips Gloeilampenfabrieken, Eindhoven, Holland, with a chapter on crystals by W. G. BURGERS. Cambridge, The University Press; New York, The Macmillan Company; 1937. Cloth, 5½ × 9 in., xviii + 376 pp., 214 fig., $6.00.

IN this work, modest in size despite the inclusiveness of its title, the author discusses the behavior of a wide variety of engineering and industrial materials under the action of stress and strain. The view-point partakes of that of the mechanical engineer, the atomic physicist and the industrial chemist, with a consequent interweaving of atomic theory and industrial test data in a most unusual manner.

In the first four chapters the author outlines the general problem of the stress-strain-time relationship of solids and viscous fluids and gives an indication of the experimental methods necessary for its investigation; then takes up the general theories of atomic and molecular structure, the solidification of matter by cooling, polymerization and the formation of gels, and the theoretical molecular strengths. There then follows, in more detailed fashion, a discussion of flow, viscosity, yield value, recovery after elastic and plastic deformation, high elasticity, rigidity and thermo-recovery.

In a fifth chapter, contributed by Dr. Burgers, the plasticity of crystals is covered in a comparatively thorough way. The stress-strain curve, strain hardening, annealing, theoretical strength and shear deformation are discussed with their relation to the crystal lattice, its deformation, its arrangement in polycrystalline aggregates and the propagation of slip through it.

The later chapters of the book cover specific classes of industrial materials, with considerable emphasis on the hypotheses of molecular arrangement, and yet with many references to industrial data and practices. Included in this treatment are the glasses, resins, asphalts, rubbers, cellulose products, proteins, doughs, paints, lacquers, clays and sulfur.

The entire work is characterized by a complete absence of dogmatism, and the reader must admire the frank way in which doubtful points are acknowledged. There is a wealth of quotations from and references to the developments of other research workers, and in fact one might almost class the book as a carefully edited symposium, or perhaps a review of current progress and thought, rather than a rigorous text or a practical exposition. In certain cases the conflicting views of different authorities are treated in such an editorial manner as to leave the lay reader not only with a feeling of respect for the open-mindedness of the author, but also with a feeling of helplessness as regards the solution of his own problem.

For the analytical philosopher specializing in any division of the field, the work should prove interesting and stimulating reading and helpful in broadening his view-point, but the student should not look to it as a text or the engineer to it as a reference book.

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